

MATERIALIZATION RESEARCH FOR EVALUATION BUILDING ELEMENTS

Existing building analysis by logical argumentation

Student

Seongchul Yu (4922484)

Chair of H&A, "Revitalizing Heritage Winterswijk"

Thesis "Cultural courtyard Boogie Woogie"

I INTRODUCTION

When we start research for design, sometimes we approach it without knowing the purpose and method of the research. After collecting a lot of meaningless information, research becomes a simple list of information. In order to avoid it and conduct research that is the basis of good design, it is important to define exactly what we want to know and to set the way to find it.

During the Lecture Series of the Research Methods, I learned a general understanding of research, how to approach problems and examples of various framework methods and methodologies. I learned about one problem or question and trying to approach it in various ways to solve it such as defining design and research, setting the research methodology and research question. It is mainly about how to start research with various methodologies. Not only practical things, but the combination with theory, history, and anthropology. And also, I realized that not only how to conduct research, but also many examples of how to express it are as important as setting up a research question.

In addition, I think the difference in such approaches can be revealed in the variety of designs that lead to the differences in research conclusions. The same goes for architecture. Even if the design is the same site and the same program, their approach, interests, and senses are integrated to reveal different designs. Eventually, different ideas lead to different ways of research, which are the basis for different designs.

Episteme exists in a broad spectrum that targets various aspects of architectural research. The research methods are not only limited to the architecture field but are particularly interesting when researching both theories and architectures in various disciplines that continually teach how to implement research methods to design methods. There are also methods that can be devised by the interrelationship between research and design as well as architectural research. Rather than strictly defining the academic boundary, research methods form and inform architectural designs at every stage of the process, and each design helps develop the ability to raise research questions from all areas not only academic but also practical.

My thesis topic is renovating Boogie Woogie music school in Winterswijk. This music school is nominated for demolition. The municipality of Winterswijk wants to build a new music school in 2020 according to the wishes of our time especially with the techniques of today because the current building built in 1972 absorbs a substantial amount of energy costs each month, which is a heavy burden on the music school's budget. The new music school to be built is part of a larger plan in Winterswijk: the Cultuurkwartier with a library, a cinema, restaurants, and a public park. Also, to be more energy-efficient, the new music school will be more modern and functional.

I think it is too pity to demolish this building. The building is still working well in the city and there has been a lot of events and performance in the music school. Therefore, my research question is this: what are the spatial values of Boogie Woogie music school for the cultural function and which values should be kept and changed for renovation?

II RESEARCH-METHODOLOGICAL DISCUSSION

For heritage architecture intervention, there has been a lot of methodologies to analyze existing building. First of all, before start to do the research, you have to proceed precedent research about background information like history of the building and site, architects and their philosophy, and excursion to the building. When these precedent researches have done, many questions come up with in your mind and research starts from analyzing the building to find answers of these questions. Meanwhile, new questions start from new answers and this process goes continuously. This is a kind of methodology led research.

Research methodologies are based on reflective practitioners and practice-based research (Lukas, 2016, p.43). The way to understand a building that already built is to reconstruct the building in 3D with the way the building built with existing drawings and documents. Through that, you can understand how to build a real building and identify essential and changeable elements. By 3D modeling, you can figure out relationships between structure, space, function, and materials. Through the reproduction of the building, each element is removed, reattached, and replaced to find the building's potential and a sleeping beauty that has not been discovered.

Architecture by itself reveals anthropology, sociology, psychology, art history and archeology. If new buildings are built, these theoretical notions need to be redefined for new buildings and times. However, when conducting research on a long-used building called Heritage, it is advisable to start with what the building currently has, something I can see and touch.

Therefore, main research framework I set is about Materialization. An already built building leaves its historical value and the memory it shares with people, on the outer shell of the building, on the objects it contains, and on the surrounding context of the building. The socially shared styles of the times when the buildings were built can be found in the structure and the way of constructing the facade. It is opposite direction to normal process of design. An artefact is a materialization of a thought. (Tim Ingold, 2007)

In order to research material cultures, the building's materials, form, and construction methods were investigated in detail. And also, finding existing values of the building is the main focus. I thought that the most important factor for the existing building research is to find out what the building itself is worth and what possibilities and limitations it has. In order to that, I analyze the separated elements of the building individually with stated methodologies. The space plan and structure of the building are inseparable from the surrounding contexts, so try to find traces of the building from a wide range of the city to very small scales of building. To define what I have to research, I use the well-known framework formulated by Steward Brand to structure my analysis of the tangible layers of the music school. (Brand, 1995).

The study of material culture centers upon objects, their properties, and the materials that they are made of, and the ways in which these material facets are central to an understanding of culture and social relations. Through that I can figure out not only physical information of the building, but also study of material practice, object-human relationship, material biography, and 'object' as source-interdisciplinary.

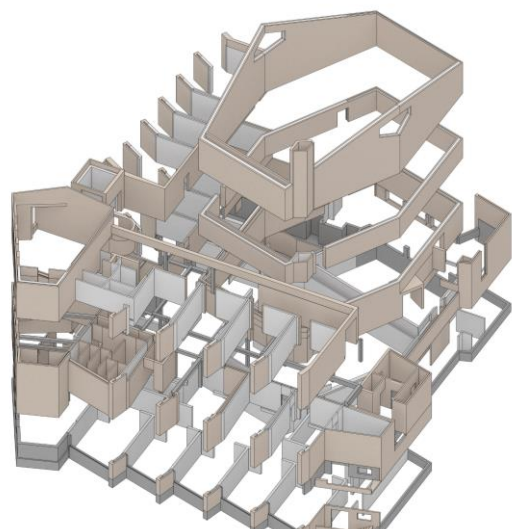
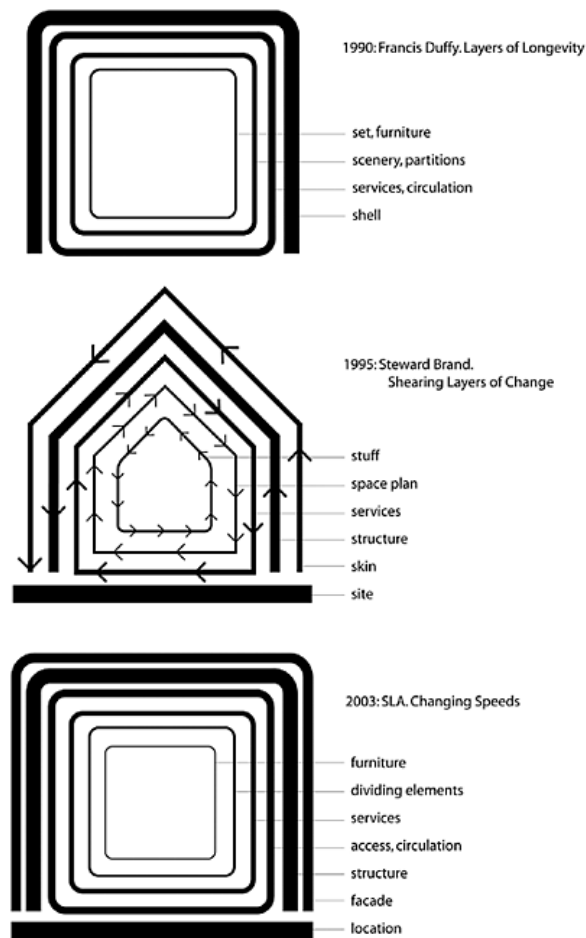


Figure 1. Load-bearing wall system by author

III RESEARCH-METHODOLOGICAL REFLECTION



In Stewart Brand's book *How Buildings Learn: What Happens After They're Built* (1995), he explained that the well-known framework formulated by him which consists of tangible layers of a building. Brand's insight is that any building can be conceived of as an assemblage of six layers: site, structure, skin, services, space plan, and stuff. Some elements of a building are easier to change than others. For each layer, the rate of change over time increases from the immobile site, which never changes, to the stuff in the interior that shifts almost daily: chairs, phones, pictures, hairbrushes, and so on. (Wang, David, and Linda Groat, 2013, p.384)

Brand built his framework on an earlier model of building-as-layers proposed by Frank Duffy. The architect Frank Duffy had thoroughly studied and illustrated techniques for serving the various kinds and rates of change in offices. Preservationists, on the other hand, were dealing with buildings that had been changed over decades and generations, and so had to develop concepts for understanding and explaining those changes. This brief excerpt is an elaboration of Duffy's four layers of "longevity of built components": Shell, Services, Scenery, and Set. (Braham, William W., and Jonathan A. Hale, 2006)

Figure 2. Braham, William W., and Jonathan A. Hale. 2006

The following layer is taken from SLA, a group based in Rotterdam. The seven system-based layers described by SLA further expand on those originally described by Brand (1995), who was expanding on earlier observations by Frank Duffy (1990). 1 Location. Generally speaking, the geographic location has a very long lifespan. 2 Structure. It is quite costly to change the foundation and the main carrying structure of buildings. 3 Access. Stairs, escape routes, escalators, and lifts have a long life, but not as long as lift shafts that are part of the main structure. 4 Facade. 5 Services. It means systems for climate control, wiring, sprinklers, water, and sewers. 6 Dividing elements. In a commercial context it means renew doors, inside walls, elevated floors, and lowered ceilings. 7 Furniture is replaced fairly quickly. For a flexible building, by and large, the dynamics of these layers have to be taken into consideration. (Braham, William W., and Jonathan A. Hale, 2006)

These frameworks are sometimes cited in tandem as one explanatory theory. Because the framework used here is not enough to research buildings and to find their values and problems. So matrices should be combined with other layers. An example of such a matrix is the value matrix by Clarke, N., & Kuipers, M. (2017), implemented by H & A students. This value matrix is a combination of Brand's layer for tangible things and Riegl's layer for intangible things.

MATERIALIZATION RESEARCH FOR EVALUATION BUILDING ELEMENTS

However, I thought that this matrix was not sufficient for logical argumentation and looked for a better value matrix to perform materialization research for renovation and studied Z. Hielkje's ABCD research method.

The ABCD research method is research on the past, present, and future of buildings. The purpose of this research framework is to delve deeper into the properties to be considered for the maintenance of buildings and the new future of buildings.

The first part of the study is about context. This deals with intangible things related to buildings. This context consists of a brief, site, architect, typology, and design process. And the second part of the research is about creation, existence, and decay. This section deals with the tangibles that are implemented. The materialization mentioned above is more related to this part than the first part. These notions analyze based on space (interior and exterior), structure (load-bearing structure and elements which determine the structure), materials, and building services.

An important point of ABCD Research is that these analysis elements are divided into three-time levels. Combining the horizontal axis of time with the vertical axis analyzing the elements forms the conclusion of the ABCD study of the building. (Z. Hielkje, 2009)

In general, the ABCD matrix can access the building deeper than the value matrix in the H & A studio. It needs much more analysis to fill in the matrix. The purpose of the research is to determine the parts to be or not to be of an existing building, making the design much more accessible. In the previous value matrix, we simply set the value and decided what parts of the design were left behind and changed. In other words, if you decide to change what and how in the post-research design process, the ABCD research method also decides what needs to be changed in the research process. Although making these decisions during research has less freedom in the design process, the design direction can be determined much more clearly. Thereby design can focus more on what's left to decide and how to change problematic parts, as determined by research. This research framework is better for logical argumentation.

ABCD[®] research matrix of the Friesland Provincial Library

ABCD [®] matrix	Meant to be	Has been	To be or not to be
Brief	<ul style="list-style-type: none"> ■ Government brief ■ Competition ■ The revised design is built 	<ul style="list-style-type: none"> ■ The function is continued ■ Complete redesign within the existing volume 	<ul style="list-style-type: none"> ■ The function is extended ■ The merger with the National Archives offers opportunities for the future
Site	<ul style="list-style-type: none"> ■ On the rampart, the old fortifications, on the edge of the city centre ■ The road isolates the rampart from the city 	<ul style="list-style-type: none"> ■ Extension into the rampart ■ The surroundings become the cultural centre of the city 	<ul style="list-style-type: none"> ■ The underground car park and the square benefit its use ■ The route to the rampart should be opened up
Architect	<ul style="list-style-type: none"> ■ Piet Tauber 	<ul style="list-style-type: none"> ■ Piet and Frans Tauber 	<ul style="list-style-type: none"> ■ Frans Tauber (successor)
Typology	<ul style="list-style-type: none"> ■ Rectangular box with atrium and tower [HVB: eerder gebruikte je steeds 'vide'] 	<ul style="list-style-type: none"> ■ Rectangular box with atrium and tower and glass entrance volume 	<ul style="list-style-type: none"> ■ Rectangular box with atrium and tower, glass entrance volume and air bridge
Design process	<ul style="list-style-type: none"> ■ In three stages ■ The client intervenes, the architect accepts this, which reduces the openness 	<ul style="list-style-type: none"> ■ The original design (stage 2) provides the basis for the final design 	<ul style="list-style-type: none"> ■ The original design is adhered to ■ Optimising openness ■ Implementing the requirements and legislation
Space	<ul style="list-style-type: none"> ■ Rectangular box with atrium and tower ■ The atrium is closed 	<ul style="list-style-type: none"> ■ The atrium is opened ■ Accessibility is improved ■ The entrance is added as a glass volume ■ The functions are relocated within the existing volumes 	<ul style="list-style-type: none"> ■ The atrium and entire plan are opened up ■ New functions, and accommodating other functions ■ Optimising the use ■ Providing a link to the National Archives
Structure	<ul style="list-style-type: none"> ■ Based on multiples of 70 mm ■ The grid of 5.18 m imposes limitations ■ Square and round columns 	<ul style="list-style-type: none"> ■ Not neutral enough to accommodate change invisibly ■ Sufficient load-bearing capacity 	<ul style="list-style-type: none"> ■ Load-bearing capacity reached ■ Able to accommodate change
Materials	<ul style="list-style-type: none"> ■ Neutral ■ Timeless ■ Durable 	<ul style="list-style-type: none"> ■ Few changes required ■ Restrained and functional ■ Repair and modification possible 	<ul style="list-style-type: none"> ■ Ageing transformed into appreciation ■ The flooring in the semibasement and the window frames require significant repairs
Services	<ul style="list-style-type: none"> ■ Minimal 	<ul style="list-style-type: none"> ■ Strict statutory requirements and comfort lead to modification and additions ■ Implemented within the available space 	<ul style="list-style-type: none"> ■ Replaced within the available space ■ Future modifications will require creative solutions

Figure 3. Example of ABCD research matrix, Z. Hielkje, 2009

IV POSITIONING

Elements in the Brand 's layer are more intuitive and easier to distinguish than the ABCD matrix. However, for the more in-depth analysis, treating tangible elements and intangible elements together using the ABCD layer can provide a more in-depth analysis of the building. The physical element of the building eventually becomes evidence and clue to intangible anthropology, sociology, psychology, art history, and archeology. Physical and mental elements interact with each other and affect all designs and functions of the building.

The ABCD matrix begins by gathering as much information as possible using all available methodologies before building the matrix. Because the direction of ABCD research is to analyze buildings in as much detail as possible. But I think such research is inefficient. Thus, they perform simple precedent research and find the information they need by making a list of questions and then answering those questions while visiting and observing the building.

To solve the repeated process of questions and answers, we look at various documents and drawings. Then go to the building to see and touch it and investigate thoroughly. Reconstruct the 2d drawings into a 3d model and a physical mock-up model, synthesize all the information found, and proceed with the simulation. Through this process, I have to reason why my project, the music school Boogie Woogie, has this materialization. For example, if you are wondering why the form of the music school is like that, you should reason about the structure of the building and its function as a music school. The question should be answered by combining who is the main user of the building and what the architect's basic philosophy was. The Brand 's layer should also divide layers that may be strongly related to the building, but the ABCD matrix is more flexible to analyze those architectural elements.

Instead of addressing all three-time bases in the ABCD matrix, I only categorize two things: what has been for the current state and what to be and not to be, the value estimates for future decisions. Because my project building was less than 50 years old and there was no change or extension during that time, there is not much information about the past. The present and the future are more important than in the past.

What to be or not to be in the ABCD matrix means to be preserved and to be replaced. Looking at my building by dividing positive and negative values that have the same meaning, I think it will be easier and more rational to make decisions. That is, each value is divided into high value, moderate value, and low value to give a hierarchy of values. A highly positive value means what has to be preserved. Negative values are problems found out through the analysis but these problems have the opportunity to be better. A highly negative value means what has to change. The reason why I want to divide this is dilemmas always come from conflicts between positive values and negative values. In order to make a better decision, I made a hierarchy for each value.

ABCD[®] matrix

	© has been	© to be or not to be
Brief	1	
Site		2 3
Architect	4	5
Typology		
Design process		6 7
Space	8	
Structure		9 10
Materials	11 12	13 14
Services		15

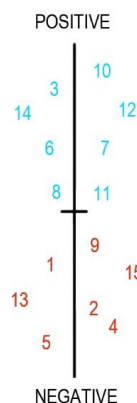


Figure 4. Example of research matrix by author

MATERIALIZATION RESEARCH FOR EVALUATION BUILDING ELEMENTS

Design for heritage architecture is, after all, a matter of what decision and how to solve it. Existing values are made more brilliant and problems that have to be solved must be solved with minimal harm to existing values. After all, research for heritage architecture is to find the value of the current building and the problem. Reconstruction of each layer through the given materials to find the relationship between the various values of the building and the elements of each building. In addition, it is necessary to find out the best way through various simulations from various angles to see what problems arise and what are the obstacles to solving them.

MATERIALIZATION RESEARCH FOR EVALUATION BUILDING ELEMENTS

BIBLIOGRAPHY (CMS) / OR REFERENCES (APA/MLA)

- Braham, William W., and Jonathan A. Hale. Rethinking technology: a reader in architectural theory. Routledge, 2006.
- Zijlstra, Hielkje. Analysing Buildings from Context to Detail in time: ABCD research method. los Press, 2009.
- Aithal, P. S. "ABCD Analysis as Research Methodology in Company Case Studies." International Journal of Management, Technology, and Social Sciences (IJMTS) 2.2 (2017): 40-54.
- Lucas, Ray. Research methods for architecture. London: Laurence King Publishing, 2016.
- Groat, Linda N., and David Wang. Architectural research methods. John Wiley & Sons, 2013.
- Sattrup, Peter Andreas. "Architectural Research Paradigms: an overview and a research example." (2012).
- Schön, Donald A. "Design as a Reflective Conversation with the Situation." The Reflective Practitioner: How professionals think in action (1983): 76-104.
- Ingold, Tim. "Materials against materiality." Archaeological dialogues 14.1 (2007): 1-16.
- Brand, Stewart. How buildings learn: What happens after they're built. Penguin, 1995.
- Van Hinte, Ed. Smart architecture. 010 Publishers, 2003.
- Kuipers, Marieke Cornelie, and Wessel de Jonge. "Designing from Heritage: Strategies for Conservation and Conversion." (2017).